

Synchrotron FTIR Mapping of Molecular Changes in Alzheimer's Diseased Brain Tissue

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Beamline(s): **U10B**

Introduction: Molecular changes appearing in the Alzheimer's diseased brain include (a) senile or neuritic plaques, (b) neurofibrillary tangles and (c) corpora amylacea. These anomalies may be identified by argyrophillic staining methods, such as the Bielschowsky stain. Both (a) and (b) involve abnormal protein conformations that may be revealed by changes in the amide I band in the mid-infrared spectrum, as well as by the appearance of unusual new absorption bands. The corpora amylacea are similarly possible to distinguish because of their vibrational profile in the fingerprint region.

Methods and Materials: Thin slices of post-autopsy AD brain tissue have been mapped with the Continuum IR microscope on the U10B beamline. Because of the extremely bright source, it is possible to obtain high signal to noise levels in spectra from areas as small as 8 x 8 micron. Variations in spectra from one pixel to another are mapped with the associated Nicolet software.

Results: We have successfully mapped several changes that are characteristic of the AD brain¹⁻³. This information is now being analyzed for clues to the etiology and pathogenesis of the disease.

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References: ¹ M.T.J. Ogg, K.M. Gough, A.E. Holliday, M.R. Del Bigio, "Vibrational microspectroscopy of corpora amylacea in human brain tissue", CSC 2000, Calgary AB, May 28-31, 2000 ² M.T.J. Ogg, K.M. Gough, A.E. Holliday, M.R. Del Bigio, "Synchrotron FTIR Analysis of Alzheimer Diseased Hippocampal Tissue", ICASS, University of Winnipeg, Aug 13-16, 2000, ³ K. Gough "Synchrotron FTIR Analysis of Molecular changes in diseased tissue", (invited talk) Department of Chemistry, University of Toronto, Toronto, Canada, Nov. 2, 1999